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tor in the College for Women, Western Reserve University.

Harrington's most elaborate paper on 'The Calciferous Glands of the Earthworm, with Appendix on the Circulation' was in press at the time of his death, and had been accepted as a thesis for the degree of Doctor in Philosophy, which he had hoped soon to receive from Columbia University. An important paper on *Amoeba* and its reaction to the stimulus of light waves of different intensities, written in collaboration with Mr. Leaming, was published during the past summer. The following briefer articles testify to his energy and enthusiasm as a field naturalist; 'Observations on the Plankton of Puget Sound' with the collaboration of his ever devoted friend, the late Professor Peck; 'Notes on the distribution and habits of some Puget Sound Invertebrates,' and on 'Nereids commensal with Hermit Crabs.'

All who knew Harrington will agree that his character, courage and earnestness in the pursuit of knowledge, which led to the sacrifice of his life are well worthy of permanent record. His sympathetic and generous mind, his capacity for friendship, his industry and zeal are endowments which any young man would be fortunate to possess. He has left an honorable name in zoology, more lasting than the simple cross which now casts its shadow on his grave.

F. H. H.

SCIENTIFIC BOOKS.

The University Geological Survey of Kansas. Special report of coal. By ERASMUS HAWORTH, assisted by W. R. CRANE, Vol. III., Topeka. J. S. Parks, State Printer. 1898. 347 pp. 70 pl. 55 Figs.

Part I. of this volume, by Professor Haworth, is a general description of the Kansas Coal Measures, which the author divides into Upper and Lower, embracing seven formations with twenty-five subordinate divisions. Some of the

latter will be subdivided in turn when further studies have been made. The total thickness is not far from 3,000 feet.

The Lower Coal Measures include the Cherokee and Marmaton formations. The Cherokee, 400 to 500 feet thick, consists mostly of shales but contains some irregular limestones and some sandstone beds of economic interest. The coal beds are important, being those mined at Pittsburg, Fort Scott and Columbus, and are available in an area of about 12,000 square miles. The Cherokee covers a wide space in Indian Territory, extends into Iowa to form part of the Des Moines formation, and Professor Haworth is inclined to think that the important coal fields of Arkansas may belong to the same horizon.

The Marmaton consists of alternating limestones and shales. The lower and middle limestones, Oswego and Pawnee, are persistent, but the intervening Labette shales are irregular in distribution. The upper limestone, the Altament, is thin and not persistent, so that the Pleasanton shales, divided at some localities by the limestone, are unbroken over a large area. The lower division of the Oswego limestone is the well-known Fort Scott cement rock. A few coal beds occur in the Marmaton, but thus far they seem to be unimportant.

The remaining five formations belong to the Upper Coal Measures as grouped by Professor Haworth.

The Pottawatomie consists of three limestones, Erie, Iola and Garnett, separated by the Thayer and Lane shales. The Erie limestones, having a maximum thickness of 225 feet, are usually triple with intervening shales, which thicken southwardly at the expense of the limestones until the latter become insignificant. The upper limestone is cherty and all are very fossiliferous. The Thayer shales have an extreme thickness of 200 feet but thin northward, so that the Iola limestone, which thickens in that direction to 200 feet, is at length practically continuous with the upper Erie. The Lane shales and Garnett limestones are somewhat irregular in their variations, but the latter, owing to erosion of the overlying shales, is exposed over a great area. This formation contains no coal of economic importance.

The Douglas begins with the Lawrence shales, varying from 300 to 800 feet, the greater thickness being at the south. In this direction it becomes largely sandstone, for a well south from the Neosho river showed 670 feet of sandstone in a total thickness of about 800 feet. Some useful coal beds are in these shales but they exhibit great variations. The Oread limestones in two beds, each 8 to 20 feet thick, are the upper member of the Douglas formation.

The higher formations, Shawnee, Wabaunsee and Cottonwood, consist of sandstones, shales and limestones, to many of which specific designations have been assigned, but all alike appear to be irregular in thickness and distribution. Generally speaking, the shales are thin in the southern portion of the State and there the limestones have not been followed out satisfactorily; but, northward, the shales are thicker and the relations of the limestones are clearer. Fossils are abundant in the limestones to the top of the Shawnee. The Osage shales at the top of the Shawnee contain the important coal beds mined at Osage City, Perton, Scranton and Carbon; but coal appears to be absent from the Wabaunsee and Cottonwood.

This part of the volume ends with a chapter explaining the nomenclature employed, and showing, as far as possible, the relations of the Kansas formations to those in adjacent states. One is tempted here to discuss the general subject of nomenclature with especial reference to the present craze for manufacture of new terms, but the temptation must be resisted, for the topic is too important and too attractive to be treated incidentally within the limits of a book notice. One may say, however, that unless some check is placed upon indulgence in this practice, a volume half as large as an unabridged dictionary will hardly suffice for definition of synonyms half a century hence. If geologists in charge of extensive areas would make a general reconnaissance before beginning detailed work, and if the geologists of adjoining states would work up in company the areas along boundary lines, some agreement might be reached respecting names. Certainly something ought to be done to stop the process of making independent classifications for petty areas and the application of different names to a single bed of

coal, limestone or sandstone. This, of course, would lessen the amount of apparently original matter in new reports, but it would lessen to a wonderful degree the labor of those who have to use reports of several states or areas during studies in comparative geology. Professor Halloworth's chapter, which is responsible for this digression, is useful, as it gives some understanding of the already annoying synonymy in some of the western states. Respecting some essential points in this chapter, relating to differences between his grouping and that of other investigators, the writer can have no opinion at present; he is too far away from the scene of strife.

The second part of the volume, by Mr. W. R. Crane deals with the economic side of the Coal Measures. It gives a detailed description of the beds now mined, belonging to the Cherokee and Osage shales. Little work has been done on beds in the intervening formations, but Mr. Crane evidently believes that some of those will be utilized. He gives a careful review of the chemical and physical properties of the Kansas coals, based on analyses and prolonged experiment. The coals show a decrease in fixed carbon in passing from south to north, as well as from east to west, with a decrease in calorific power. Mr. Crane suggests that this change is due to the facts that the beds at the south and east are older than the others, and that they have been subjected to orographic action while the others have not. A chapter is given upon clay veins, which are thought to be due to earth tremors, by which the coal was fractured and the clay pressed into the cavity. The irregular sub-conical or bell-shaped protrusions from the roof are explained as filled depressions. Some of these are interesting as they have a thin casing of anthracite coal. The coal output of the state has grown from 1,211,057 tons in 1885, to 3,291,806 tons in 1897. Mr. Crane gives descriptions of methods of mining and drainage, as well as of machinery; a directory of the mines in the state; and concludes his work with a summary of the mining laws of the state.

The volume is illustrated elaborately and has an index of 11 pages, with double columns. It is a useful contribution to the advancement of the economic interests of Kansas, and is of a

type to justify fully the expenditure. Unfortunately it is disfigured by a great number of typographical errors, for most of which the authors are, clearly, not responsible. A reform in public printing offices is necessary, for, in too many cases, reports are a source of annoyance and confusion of face to those who prepare them.

JOHN J. STEVENSON.

Les matières colorantes azoïques. GEORGES F. JAUBERT. Docteur ès Sciences, ancien Préparateur de Chimie à l'École Polytechnique. Petit in-8. (*Encyclopédie scientifique des aide-mémoire.*)

This little book appears as one of the volumes in the 'Encyclopédie scientifique des aide-mémoire,' now being published in Paris under the direction of M. Léauté, Member of the Institute. It is a sequel to a previous volume in the collection, and by the same author, entitled 'L'Industrie du goudron de houille.'

The subject matter is divided into the following chapters: 1. Nitro colors; 2. Azoxy colors; 3. Azo derivatives; 4. Aminoazo colors; 5. Oxyazo colors; 6. Azo colors dyeing upon mordants; 7. Polyazo colors derived from monamines; 8. Polyazo colors derived from diamines. The chapters on the Nitro and Azoxy colors are inserted as introductory to the Azo colors. The few pages of text present are devoted to a brief statement of the most important general properties of the Nitro, Azoxy, and Azo dyes; while the body of the work is made up of a tabular classification of the more prominent Azo colors, under the following column headings: Scientific and trade name; method of preparation; chemical formula, empiric and constitutional; literature, patents, etc., properties, reactions, etc., industrial application. It will thus be seen that the classification is practically the same as that made familiar to all color chemists by the tables of Schultz and Julius, and also used by Hehne, Green, Seyewetz and Sisley, and others. The book is, however, of a much more convenient size than the work of Schultz and Julius, although its scope is more limited. The newer Tetrazo colors, which have played such a prominent part in the substantive dyeing of cotton, are very fully listed. Several typographical

errors will be found in the text and in the constitutional formulas.

Dealing, as it does, with the most numerous and the most important group of all artificial dyestuffs, the Azo Colors, this succinct classification should prove most useful both to the student and to the manufacturer.

M. T. B.

A Century of Vaccination and What it Teaches.

By W. SCOTT TEBB. London, Swan, Sonnerschein & Co. 1899. Second Edition.

In this book of 403 pages, Dr. Tebb presents at considerable length the usual anti-vaccination arguments, directing them by English examples especially to an English audience, and attacks the compulsory vaccination common in England before the law of 1898. Much of the space in the book is taken up with settled questions or matters not directly concerned in the point at issue; for example thirty pages discuss admittedly inconclusive experiments performed about 1800, thirty are spent on the unsanitary conditions of England in the last century, and of any place in war time, and twenty-six more give examples of small-pox occurring after vaccination and revaccination.

Dr. Tebb's reasoning is three-fold: First, that an attack of cow-pox does not secure immunity against small-pox because the latter disease sometimes follows the former; second, that serious injuries are produced by vaccination, and third that even if immunity could be gained by vaccination, compulsion would be unjustifiable. Immunity from any disease is a clinical fact not yet by any means fully understood; and it is well known both that some persons variously estimated at from 1 to 2 per cent. are naturally immune to small-pox, just as there are some immune to almost every other infectious disease, and that small-pox sometimes occurs and even proves fatal after both vaccination and revaccination and after a previous attack of small-pox. All now claimed is that successful vaccination confers against small-pox an almost absolute immunity for six months, and then further for an unknown and variable length of time a certain degree of immunity which is greater than can be gained in any other way except, by taking the disease. The